Test Report
Field Density Test by Sand Replacement Method

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Site Type	Wet Mix Macadam
Contractor	M/s KRIDL
Test Method	IS: 2720 (Part - 16) 1963 & Specification for Road & Bridge Works,
Location	bay
Material	Wet Mix Macadam
Sample No	3
Date	22-May-2018

Test Hole No	3
MDD	2.24
OMC in %	3.20
Bulk Density Ys	1.39
Weight of Sand In cone W1 (gm)	1195.00
Weight Of Wet soil From Hole (W2)	4430.00
Weight of Sand +Cylinder Before Pouring (W3)gm	17000.00
Weight of Sand +Cylinder After Pouring (W4) gm	13110.00
Weight of Sand In Hole: W5 = W3 - W4- W1 (gm)	2695.00
Volume of Hole: V= W5/ Ys	1936.06
Bulk Density Yb= W2/V (gm/cc)	2.29
Moisture Meter Reading (%)	1.56
Moisture Content : w (From Graph In %)	3.32
Dry Density Yd = Yb/(1+W/100)	2.21
Field Compaction(%)	98.87

Note:

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For Mecadez Core Technologies Private Limited

Authorised Signature

Test Report
Field Density Test by Sand Replacement Method

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Test Type	Wet Mix Macadam
Contractor	M/s KRIDL
Test Method	IS: 2720 (Part - 16) 1963 & Specification for Road & Bridge Works,
Location	bay
Material	Wet Mix Macadam
Sample No	4
Date	22-May-2018

Test Hole No	4
MDD	2.24
OMC in %	3.20
Bulk Density Ys	1.39
Weight of Sand In cone W1 (gm)	1195.00
Weight Of Wet soil From Hole (W2)	4435.00
Weight of Sand +Cylinder Before Pouring (W3)gm	17000.00
Weight of Sand +Cylinder After Pouring (W4) gm	13115.00
Weight of Sand In Hole: W5 = W3 - W4- W1 (gm)	2690.00
Volume of Hole: V= W5/ Ys	1932.47
Bulk Density Yb= W2/V (gm/cc)	2.29
Moisture Meter Reading (%)	1.54
Moisture Content : w (From Graph In %)	3.53
Dry Density Yd = Yb/(1+W/100)	2.22
Field Compaction(%)	98.96

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Test Report
Quality of Bitumen

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Mix Type	Bituminous Macadam
Contractor	M/s KRIDL
Test Method	IS : 73 – 1992 & Specification for Road & Bridge Works, MORT&H, Revision IV.
Grade of Bitumen	60 / 70
Location	Hot Mix Plant
Material	Bitumen
Sample No	1
Date	2-Jun-2018

Sl. No.	Description	Test Results	Requirement as per IS:73 - 1992
1	Penetration at 25^0C , 1 / 10 mm	66	60 – 70
2	Softening Point, (^{0}C)	48	45 – 55
3	Specific Gravity	1.1	Min. 0.97
4	Ductility at 27^0C, in cm	84	Min. 75
5	Flash Point, (^{0}C)	185	Min. 175

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Test Report
Quality of Bitumen

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No.	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Work Type	Bituminous Macadam
Contractor	M/s KRIDL
Test Method	IS : 73 – 1992 & Specification for Road & Bridge Works, MORT&H, Revision IV.
Grade of Bitumen	60 / 70
Location	Hot Mix Plant
Material	Bitumen
Sample No.	2
Date	3-Jun-2018

Sl. No.	Description	Test Results	Requirement as per IS:73 - 1992
1	Penetration at 25^{0}C , 1 / 10 mm	62	60 – 70
2	Softening Point, (^{0}C)	54	45 – 55
3	Specific Gravity	1.1	Min. 0.97
4	Ductility at 27^{0}C, in cm	79	Min. 75
5	Flash Point, (^{0}C)	180	Min. 175

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Test Report
Rate of Spread of Tack Coat

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Macadam
	M/s KRIDL
	At Site
	Bitumen
	1
	5-Jun-2018

Determination	Unit	Test No 1		
		Longitudinal Distribution		
Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
Area of the Plate (a)	m^2	0.04	0.04	0.04
Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
Final weight of plate after application of Tack Coat (c)	kg	1.658	1.652	1.651
Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.017	0.011	0.01
Rate of spread (d/a)	kg / m^2	0.425	0.275	0.250
Average	kg / m^2	0.317		
Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.317 kg / m2

Remarks:

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Test Report
Rate of Spread of Tack Coat

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Lab No.	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Test Type	Bituminous Macadam
Contractor	M/s KRIDL
Location	At Site
Material	Bitumen
Sample No	2
Date	6-Jun-2018

Sl. No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.656	1.654	1.655
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.015	0.013	0.014
6	Rate of spread (d/a)	kg / m^2	0.375	0.325	0.35
7	Average	kg / m^2	0.350		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.350 kg / m2

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Test Report
Rate of Spread of Tack Coat

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Lab No.	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Test Type	Bituminous Macadam
Contractor	M/s KRIDL
Location	At Site
Material	Bitumen
Sample No	3
Date	5-Jun-2018

Sl. No.	Determination	Unit	Test No 1		
			Longitudinal Distribution		
1	Size of Plate (mxn)	m^2	0.2x0.2	0.2x0.2	0.2x0.2
2	Area of the Plate (a)	m^2	0.04	0.04	0.04
3	Initial weight of the empty Plate (b)	kg	1.641	1.641	1.641
4	Final weight of plate after application of Tack Coat (c)	kg	1.659	1.652	1.651
5	Weight of Prime coat/ Tack Coat (d = c-b)	kg	0.018	0.011	0.01
6	Rate of spread (d/a)	kg / m^2	0.45	0.275	0.25
7	Average	kg / m^2	0.325		
8	Specified Limit	kg / m^2	Not less than 0.25 kg / m^2		

Results: Rate of Spread of Prime Coat / Tack Coat is: 0.325 kg / m2

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Test Report
Aggregate Impact Value

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Macadam
	M/s KRIDL
	IS : 2386 (Part - 4) 1963 & Specification for Road & Bridge Works, MORT&H, Rev. V.
	At Site
	Coarse Aggregate
	1
	4-Jun-2018

Sl. No.	Determination	Unit	Trails	
1	Weight of empty cylinder, w1	gm	960	960
2	Weight of container filled with Aggregate, w2	gm	1313	1309
3	Weight of the Aggregate before compaction, (w2 - w1) = w3	gm	353	349
4	Weight of the sample passing through 2.36 mm IS sieves after Impact, w4	gm	85	83
5	Weight of the sample retained on 2.36 mm IS sieve after Impact, w5	gm	268	266
6	Aggregate Impact Value (w4 / w3)x100	%	24.08	23.78
7	Specified Limit	%	27	

Results: Average Aggregate Impact Value: **23.93** %

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relate only to the items tested.

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Test Report
Aggregate Particle Shape

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Macadam
	M/s KRIDL
	IS : 2386 (Part - 1) 1963 & Specification for Road & Bridge Works, MORT&H, Rev. V.
	Hot Mix Plant
	Coarse Aggregates
	2
	4-Jun-2018

Retained on IS Sieves (mm)	Weight of Retained Sample on Each Sieve (minimum 200 Pieces) (gm)	Flakiness Index		Elongation Index	
		Thickness Gauge	Weight of Aggregates in each fraction passing on thickness gauges (gm)	Length Gauge	Weight of Aggregates in Fraction retained on length gauges (gm)
50	0	33.9	0	-	0
40	0	27	0	81	0
25	0	19.5	0	58.5	0
25	0	16.95	0	-	0
20	1569	13.5	249	40.5	267
16	1430	10.8	109	32.4	136
12.5	961	8.55	156	25.6	163
10	477	6.75	79	20.2	85
6.3	245	4.89	67	14.7	74
SW	4682	SWf	660	SWe	725

14.10	%
15.48	%

Flakiness and Elongation Indices : 29.58 %

Maximum allowable Combined Flakiness and Elongation Indices for

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Test Report
Aggregate Stripping Value

[illegible]	Improvements to roads and drains at Kogilu Layout at Ward No.05.
[illegible]	Road Infrastructure, Project Division Yalahanka
[illegible]	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
[illegible]	Bituminous Macadam
[illegible]	M/s KRIDL
[illegible]	IS : 6241 - 1971 & Specification for Road & Bridge Works, MORT&H, Revision V.
[illegible]	Hot Mix Plant
[illegible]	Coarse Aggregates / Bitumen
[illegible]	1
[illegible]	4-Jun-2018
[illegible]	Coarse Aggregate
[illegible]	60 / 70 Grade
[illegible] Used	5% by weight
[illegible]	200 gms
[illegible]	10 gms
[illegible]	40^0C

[illegible] Number	Stripping Percentage	Average Percentage	Average Retained Coating (%)
1	3	3.1	96.9
2	3.1		
3	3.2		

[illegible] **Minimum allowable Aggregate Stripping Value for Dense Bituminous** [illegible] is 95%.

Note:

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The results relate only to the items tested.

This test report should not be reproduced except in full, without written approval [illegible].

Any enquiry regarding the report must be reported immediately.

For Mecadez Core **Technologies Private Limited**

Authorised Signature

Test Report

Specific Gravity and Water Absorption

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Mix Type	Bituminous Macadam
Contractor	M/s KRIDL
Test Method	IS: 2386 (Part - 111) 1963 & Specification for Road & Bridge Works, MORT&H, Rev. V.
Location	Hot Mix Plant
Material	Coarse Aggregates
Sample No	1
Date	4-Jun-2018

Particulars	Computations	Test Numbers		Mean
		Test 1	Test 2	
Weight of Empty Basket Immersed in Water	W_1 g	765	765	
water	W_2g	2040	2050	
Weight of Saturated Aggregate in water	W_sg = W_2- W_1	1275	1285	
Weight of saturated surface dry aggregate in Air	W_3 g	2075	2075	
Aggregate	W_3- W_s	800	790	
Weight of Oven dried Aggregate	W_4g	2036	2046	
Specific Gravity	W_4/(W_3- W_s)	2.55	2.59	2.57
Apparent Specific Gravity	W_4/(W_4- W_s)	2.68	2.69	2.68
Water Absorption	(W_4- W_3)*100/ W_4	1.92	1.42	1.67

Comments: Minimum allowable Aggregate Water Absorption value for Dense bituminous Macadam is 2.0%.

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Test Report
Aggregate Gradation

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Macadam
	M/s KRIDL
	IS : 2386 (Part - 1) 1963 & Specification for Road & Bridge Works, MORT&H, Rev. V.
	Hot Mix Plant
	Coarse Aggregates
	1
	4-Jun-2018

4000 gms

Sieve size (mm)	Weight Retained (gm)	Percentage of weight Retained (%)	Cumulative Percentage of weight retained	Cumulative % of Passing		Remarks
				Test Result	Gradation Limits as per MORT&H	
37.5	0	0	0	100	100	Gradation satisfies the MORT&H Specification for Dense graded biyuminous macadam
26.5	186	4.65	4.65	95.35	90-100	
19	854	21.35	26.00	74.00	71-95	
13.2	655	16.38	42.38	57.63	56-80	
4.75	660	16.50	58.88	41.13	38-54	
2.36	350	8.75	67.63	32.38	28-42	
0.3	702	17.55	85.18	14.83	(7-21)	
0.075	275	6.88	92.05	7.95	(2-8)	

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Test Report
Stability of Mix

Project Name	Improvements to roads and drains at Kogilu Layout at Ward No.05.
Client	Road Infrastructure, Project Division Yalahanka
Job No	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
Mix Type	Bituminous Macadam
Contractor	M/s KRIDL
Test Method	Specification for Road & Bridge Works, MORT&H, Revision V.
Location	Bay
Sample No	1
Date	5-Jun-2018

Sl No.	Description	Unit	Test 1	Requirements as per MORT&H
1	Marshal Stability	KN	9.74	9 KN (min)
2	Marshal Flow	mm	3.4	2 – 5 mm
3	Percent of Air Voids in mix	%	4.4	3-5..
4	Percent of Voids in Mineral Aggregates filled with Bitumen	%	73	65 – 75 %
5	Density	g/cc	2.23	2.22 g/cc

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Test Report
Stability of Mix

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Macadam
	M/s KRIDL
	Specification for Road & Bridge Works, MORT&H, Revision V.
	Bag
	2
	6-Jun-2018

Description	Unit	Test 1	Requirements as per MORT&H
Marshal Stability	KN	9.51	9 KN (min)
Marshal Flow	mm	3.62	2 – 5 mm
Percent of Air Voids in mix	%	4.51	3-5
Percent of Voids in Mineral Aggregates filled with Bitumen	%	72.1	65 – 75 %
Density	g/cc	2.2	2.22 g/cc

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Mecadez Core Technologies Private Limited

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Test Report
Stability of Mix

	Improvements to roads and drains at Kogilu Layout at Ward No.05.
	Road Infrastructure, Project Division Yalahanka
	MCTPL/BBMP/Project YNK/PMC/2017-2018/QR/04
	Bituminous Macadam
	M/s KRIDL
	Specification for Road & Bridge Works, MORT&H, Revision V.
	Bay
	3
	5-Jun-2018

Description	Unit	Test 1	Requirements as per MORT&H
Marshal Stability	KN	9.74	9 KN (min)
Marshal Flow	mm	3.4	2 – 5 mm
Percent of Air Voids in mix	%	4.4	3-5
Percent of Voids in Mineral Aggregates filled with Bitumen	%	73	65 – 75 %
Density	g/cc	2.21	2.22 g/cc

Remarks:

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